

1 **CLAIMS**

2 What is claimed is:

3 1. An extensible-markup-language Path Language (XPath)
4 evaluating method for evaluating the XPath relevant to an
5 extensible-markup-language (XML) document by use of a
6 computer, the XPath evaluating method comprising:

7 a first step of serially inputting XML event strings
8 constituting an XML document to be processed;

9 a second step of serially evaluating the XPath respec-
10 tively relevant to the inputted XML events and retaining
11 information concerning a result of partial evaluation of the
12 XPath in given storing means when the XPath is partially
13 established with respect to a given XML event; and

14 a third step of repeating the partial evaluation of the
15 XPath along with the input of the XML event strings while
16 considering the result of the partial evaluation retained in
17 the storing means and evaluating that the XPath is estab-
18 lished with respect to the XML document when the last part of
19 the XPath is established.

20 2. The XPath evaluating method according to claim 1,

21 wherein the second step includes the steps of:

1 generating an automaton for expressing the XPath to be
2 evaluated; and

3 evaluating the XPath partially by allowing transition
4 of a state of the automaton based on inputted respective XML
5 events and retaining a result of the partial evaluation as
6 the state of the automaton.

7 3. The XPath evaluating method according to claim 1,

8 wherein the second step includes the steps of:

9 generating a first stack which expresses the XPath to
10 be evaluated with a string of stack elements; and

11 generating a second stack for analyzing a nested struc-
12 ture of the XML document to be processed based on respective
13 inputted XML events and then evaluating the XPath partially
14 by comparing the first stack with the second stack.

15 4. The XPath evaluating method according to claim 1,

16 wherein the second step includes the steps of:

17 serially constructing a document tree indicating a
18 document structure of the XML document to be processed based
19 on input of respective XML events; and

20 evaluating the XPath along with construction of the
21 document tree by use of the document tree including a part
22 which has been constructed.

1 5. An XPath evaluating apparatus comprising:

2 an evaluation executing unit for inputting XML event
3 strings constituting an XML document and serially evaluating
4 the XPath with respect to each of XML events, while retaining
5 information concerning a result of partial evaluation of the
6 XPath when the XPath is partially established with respect to
7 a given XML event, and evaluating that the XPath is estab-
8 lished with respect to the XML document when the last step of
9 the XPath is established; and

10 an XML event transferring unit for inputting the XML
11 event strings constituting the XML document to be processed
12 and serially transferring the XML event strings to the
13 evaluation executing unit.

14 6. The XPath evaluating apparatus according to claim 5,
15 further comprising:

16 an automaton generating unit for generating an automa-
17 ton which expresses the XPath to be evaluated,

18 wherein the evaluation executing unit performs partial
19 evaluation of the XPath by allowing a state of the automaton
20 generated by the automaton generating unit to perform transi-
21 tion based on the XML events transferred from the XML event
22 transferring unit, and retains a result of the partial

1 evaluation as the state of the automaton.

2 7. The XPath evaluating apparatus according to claim 5,
3 further comprising:

4 a stack generating unit for generating a first stack
5 which expresses the XPath to be evaluated with a string of
6 stack elements,

7 wherein the evaluation executing unit performs partial
8 evaluation of the XPath by generating a second stack for
9 analyzing a nested structure of the XML document subject to
10 processing based on the XML events transferred from the XML
11 event transferring unit and then comparing the first stack
12 generated by the stack generating unit with the second stack.

13 8. An XPath evaluating apparatus comprising:

14 a document tree constructing unit for inputting XML
15 event strings which constitute an XML document and serially
16 constructing a document tree indicating a document structure
17 of the XML document based on inputted XML events along with
18 the input of the respective XML events;

19 an XML event transferring unit for inputting the XML
20 event strings which constitute the XML document to be
21 processed and serially transferring the XML event strings to
22 the document tree constructing unit; and

1 an evaluation executing unit for evaluating the XPath
2 along with construction of the document tree by the document
3 tree constructing unit, using the document tree with a part
4 which has been constructed.

5 9. The XPath evaluating apparatus according to claim 8,
6 wherein the evaluation executing unit retains informa-
7 tion concerning a result of partial evaluation of the XPath
8 when the XPath is partially established upon the evaluation
9 of the XPath using the document tree.

10 10. An information processing apparatus comprising:

11 an XML parser for analyzing an XML document to be
12 processed and thereby generating XML event strings;

13 an XPath evaluating unit for serially inputting the XML
14 event strings generated by the XML parser and evaluating the
15 XPath with respect to each of inputted XML events by stream-
16 ing processing; and

17 an application executing unit for inputting the XML
18 events generated by the XML parser and performing processing
19 with respect to the XML document configured by the XML events
20 in response to an evaluation result of the XPath by the XPath
21 evaluating unit,

22 wherein the XPath evaluating unit serially evaluates

1 the XPath with respect to each of the XML events, retains
2 information concerning a result of partial evaluation of the
3 XPath when the XPath is partially established with respect to
4 a given XML event, and judges that the XPath is established
5 with respect to the XML document when the last step of the
6 XPath is established.

7 11. The information processing apparatus according to claim
8 10,

9 wherein the XPath evaluating unit generates an automa-
10 ton for expressing the XPath to be evaluated,

11 performs partial evaluation of the XPath by allowing
12 transition of a state of the automaton based on the XML
13 events generated by the XML parser, and retains a result of
14 the partial evaluation as the state of the automaton.

15 12. The information processing apparatus according to claim
16 10,

17 wherein the XPath evaluating unit generates a first
18 stack which expresses the XPath to be evaluated with a string
19 of stack elements, generates a second stack for analyzing a
20 nested structure of the XML document to be processed based on
21 the XML events generated by the XML parser, and performs
22 partial evaluation of the XPath by then comparing the first

1 stack with the second stack.

2 13. The information processing apparatus according to claim
3 10,

4 wherein the XPath evaluating unit serially constructs a
5 document tree indicating a document structure of the XML
6 document to be processed based on inputted XML events along
7 with the input of the respective XML events generated by the
8 XML parser, and evaluates the XPath by use of the document
9 tree with a part which has been constructed.

10 14. A program for controlling a computer to evaluate the
11 XPath with respect to an XML document, the program causing
12 the computer to execute the procedures for carrying out the
13 steps of claim 1.

14 15. An article of manufacture comprising a computer usable
15 medium having computer readable program code means embodied
16 therein for causing evaluation of the XPath relevant to an
17 extensible-markup-language (XML) document, the computer
18 readable program code means in said article of manufacture
19 comprising computer readable program code means for causing a
20 computer to effect the steps of claim 1.

1 16. A program storage device readable by machine, tangibly
2 embodying a program of instructions executable by the machine
3 to perform method steps for evaluating the XPath relevant to
4 an extensible-markup-language (XML) document, said method
5 steps comprising the steps of claim 1.

6 17. A computer-readable recording medium comprising the
7 program according to claim 14.

8 18. A computer program product comprising a computer usable
9 medium having computer readable program code means embodied
10 therein for causing XPath evaluation, the computer readable
11 program code means in said computer program product compris-
12 ing computer readable program code means for causing a
13 computer to effect the functions of claim 5.

14 19. A computer program product comprising a computer usable
15 medium having computer readable program code means embodied
16 therein for causing XPath evaluation, the computer readable
17 program code means in said computer program product compris-
18 ing computer readable program code means for causing a
19 computer to effect the functions of claim 8.

20 20. A computer program product comprising a computer usable

1 medium having computer readable program code means embodied
2 therein for causing information processing, the computer
3 readable program code means in said computer program product
4 comprising computer readable program code means for causing a
5 computer to effect the functions of claim 10.